**549**

## BRAIN DEVELOPMENT IN CHIMPANZEES: A COMBINED 3D ULTRASOUND AND MRI STUDY

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The human brain size has increased dramatically since the appearance of the genus *Homo* ca. 2 million years ago, making humans markedly different from other primates in numerous cognitive features. Here, we applied ultrasonography (US) and magnetic resonance imaging (MRI) to reveal the characteristics of size development of the brain in chimpanzees during fetal and juvenile period. In the US study, we longitudinally obtained fetal brain volume data from two pregnant chimpanzees. The similarity between humans and chimpanzees includes a rapid growth of the cerebrum during the first half of pregnancy. In contrast, the chimpanzee brain developed differently from the human in that the developmental rate of the cerebrum was decreased during the second half of pregnancy. In the MRI study, we longitudinally obtained 3D T1-weighted images from three growing chimpanzees during infancy and juvenile period. Similar to humans, the cerebral white matter volume increased gradually with age through infancy and juvenile period, and appears to continue until adulthood. On the other hand, unlike neural maturation in humans, the developmental peak of the cerebral gray matter in chimpanzees had already reached the maximum in early juvenile period. These findings suggest that delayed brain development played a crucial role for the enlargement of human brain during fetal and juvenile period and contributed to the emergence of human-specific cognition during infancy and juvenile period. Our findings shed light on understanding of human brain evolution.

Keywords: brain maturation, developmental retardation, human evolution, imaging techniques